

A NEW FOSSIL INSECT WING FROM TRIASSIC BEDS NEAR DEEWHEY, N.S.W.

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(Plate xxxvi and one Text-figure.)

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Through the kindness of Professor Sir T. W. E. David, F.R.S., Emeritus Professor of Geology in the University of Sydney, I have been enabled to study a remarkable new insect wing which has recently been discovered in a magnificent state of preservation in a quarry at Beacon Hill, near Deewhey (not far from Manly), N.S.W. The bed from which this wing comes is a shale bed, about the middle of the Hawkesbury Sandstone (Middle Triassic), *i.e.*, about 500 feet above the base of this sandstone; thus it will be seen that the wing is older than those found at Ipswich, Queensland, and at St. Peter's, Sydney.

Professor David writes as follows concerning the discovery of this fossil: "There was more of the fossil when the quarrymen broke open the shale, but unfortunately Mr. Scully (a most careful and enthusiastic collector, one of the quarrymen) accidentally broke it in trying to get it out, and the body flew into a thousand fragments. We must be thankful, however, for the beautiful wing. But for Mr. Scully it would have been pressed into bricks, probably in a few minutes' time."

Before describing this fossil, which consists, unfortunately, only of about the distal two-thirds of an enormous wing, I would like to say what a great loss has been sustained just by the failure to retrieve the rest of the specimen. This fossil belongs to the rarest and least known of all orders of fossil insects, and it is so wonderfully preserved that its head and body, particularly if, as I suspect, the mouth-parts were displayed *in situ*, would have afforded one of the most wonderful discoveries ever made in fossil Insecta. It is greatly to be hoped that some way may be found to get all the quarrymen in the Triassic shale-beds around Sydney interested in these wonderful fossils, a large number of which have probably gone already into the making of bricks for Sydney suburban houses.

In 1916, when I first started studying fossil insects, I described as *Mesotitan giganteus* Till.* a very large but badly preserved fossil insect from the Wianamatta Shale (Upper Triassic) of St. Peter's, Sydney, placing it in the Order Protorthoptera. The condition of this fossil was not such as to allow of any accurate placing or diagnosis of it, but considerable portions of three wings were preserved, showing the main courses of the basal parts of the veins, and also the remarkable

* "Mesozoic and Tertiary Insects of Queensland and N.S.W." Queensland Geol. Survey, Publ. No. 253, 1916, p. 40, Pl. 7, fig. 2.

archedictyon or meshwork of fine veinlets and crossveins between them. A considerable part of the body was indistinctly visible; but, most unfortunately, a large triangular crack in the rock had removed the head entirely. Having given this fossil some further study from time to time, I have become more and more inclined to the view that it is not a member of the Order Protorthoptera at all, but belongs to the very rare and problematical Order Protohemiptera, founded by Handlirsch for the wonderful Lower Permian fossil *Eugereon boeckingi* Dohrn from Germany. This insect was of large size (Handlirsch's estimate of its expanse of wing is 160 mm., or over six inches). Its most remarkable characteristics are the broadly flanged pronotum, resembling that of certain Carboniferous forms, and the very small head provided with mouth-parts forming a very long and slender sucking-beak, which projects straight out in front of the head. Probably no type of mouth-parts has given rise to more discussion than this, and its relationships, if any, to the mouth-parts of recent Hemiptera are still not satisfactorily determined. Hence the discovery of the head and mouth-parts of a related fossil form, in the wonderful state of preservation of this new fossil, would be a find of the utmost importance, and it is to be hoped that it will one day be made.

The head and mouth-parts of the new fossil not being available, one has to fall back on what is left of the wing for evidence of its relationships. The parts preserved are just those, viz. the distal two-thirds of the wing, which are absent from *Eugereon* and also to a great extent from *Mesotitan giganteus*. Nevertheless the general scheme of venation agrees well enough in all three cases, and the strongly-marked character of the *archedictyon*, in conjunction with the immense size (no other fossils approaching these except only the gigantic Meganeuridae, which are of a very different type), make it certain to my mind that the new fossil must be placed in the genus *Mesotitan*, and that that genus must now find its proper place within the Order Protohemiptera.

Order Protohemiptera.

Restricting our study of this Order to venation, we may state that the following combination of characters will define it:—

Apart from the anals, there are only two convex veins in the wing, viz. R_1 and Cu_1 , and both of these are unbranched; no anterior median (MA) or interpolated convex sectors are present. (This character enables us at once to distinguish this Order from Protodonata). Cu_2 , which in nearly all Orders is a simple vein, is strongly developed, with many branches; this is a striking and most unusual character. A complete set of costal veinlets is present, arising from the well-developed Sc. Throughout the rest of the wing, between all the main veins and their branches, the membrane of the wing is covered with a very characteristic *archedictyon*, consisting for the most part of very closely set, transverse, delicate crossveins, the distance between two such consecutive crossveins being very small compared with their length; in the wider spaces, and towards the margin of the wing, these tend to become interrupted by a weak and irregular line dividing them into upper and lower sets, or even to become split up into very irregular polygonal areas. This *archedictyon* is so characteristic that I am not able to name a single wing outside of this Order which possesses it, and I think a careful study of Plate xxxvi will convince anybody that it must be regarded as one of the diagnostic characters of the Order.

Using venational characters only, the two families represented in this Order may be defined as follows:—

- Costal veinlets excessively numerous and close, either transverse or slanting towards the base; Cu_2 only reaching to about half-way along wing Fam. Eugereonidae Handl.
 Costal veinlets moderately numerous, not so close together, slanting very obliquely towards apex; Cu_2 ending up far beyond half-way Fam. Mesotitanidae, fam. nov.

The Eugereonidae are only known from the Lower Permian of Germany, the Mesotitanidae from the Triassic of Australia.

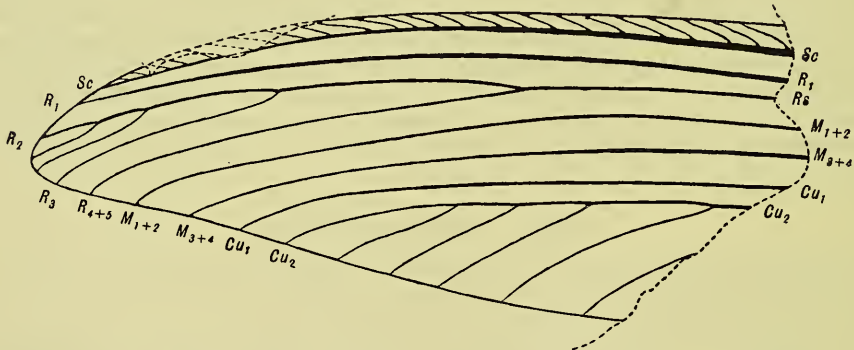
Family Mesotitanidae, nov.

This family is here proposed for the reception of *Mesotitan giganteus* Till. from the Upper Triassic of St. Peter's, Sydney, and the new species described below. Its characters have already been defined in the Key given above.

Genus MESOTITAN Till.

Characters as for the family; in addition, R_s pectinate, four-branched, M two-branched, Cu_2 with pectinate series of descending branches.

Genotype, *Mesotitan giganteus* Till.



Text-fig. 1.—*Mesotitan scullyi*, n. sp., preserved portion of forewing from Beacon Hill, near Deewhy, N.S.W. Order Protohemiptera, fam. Mesotitanidae. Length 86.5 mm. Archedictyon omitted.

MESOTITAN SCULLYI, n. sp. Plate xxxvi; text-fig. 1.

Total length of wing preserved, 86.5 mm., indicating a full wing-length of at least 130 mm. and an expanse of wing of 275 mm. or about 11 inches. Greatest width (at break), 34.5 mm.

Apex of wing strongly pointed, slightly nodding. The preserved part of the wing consists of about the distal two-thirds, and does not include the origin of R_s or the forkings of M and Cu, nor is any of the anal area present.

Sc markedly concave, very strongly developed, with slender but clearly marked costal veinlets arising along its whole length; end of Sc about 12 mm. before apex. R_1 markedly convex, but not quite as stout as Sc, running below and subparallel to it and ending just beyond it above apex. R_s a slender, concave vein, unbranched

until well past half-way along wing, when it gives off an obliquely descending pectinate series of four veins, the first being R_{4+5} , the second R_3 , and the third and fourth two short terminal branches from R_2 , the last of which ends at the actual apex of the wing. M with two branches only, M_{1+2} and M_{3+4} , running subparallel to one another and also to R_3 and R_{4+5} above and Cu_1 below. Both these branches being concave, there is clearly no MA present. Cu_1 not very strongly developed, but markedly convex, running subparallel to and a little above the well-developed, concave Cu_2 , from which a descending pectinate series of five branches is visible.

Archedictyon as shown in Plate xxxvi.

Pigmentation evidently present, the wing being mottled in alternating areas of light and dark pigment, these areas being mostly squarish and tending to form irregular transverse fasciae; eight or nine such dark brown fasciae can be made out crossing the lighter parts of the wing from the costal margin on the part preserved.

The wing is almost certainly a forewing.

Type, Holotype, Specimen No. 20270, labelled "Beacon Hill, Deewhy," on under-side of rock; in Coll. Mining Museum, Sydney, N.S.W.

The species is dedicated to its discoverer, Mr. Scully, to whom the thanks of all palaeontologists and entomologists are due for preserving it from destruction.

The photograph in Plate xxxvi was taken by Mr. W. C. Davies, Curator of the Cawthron Institute, to whom my thanks are due for this excellent result. In order to see the convexity and concavity of the veins correctly in this photograph, it should be looked at either from the broken basal end, or else with the posterior margin uppermost.

EXPLANATION OF PLATE XXXVI.

Mesotitan scullyi, n. sp., preserved portion of forewing. Order Protohemiptera,
fam. Mesotitanidae. Length 86.5 mm. [W. C. Davies photo.]

Postscript, added 2nd September, 1925.—Since the above paper was written, an artist friend of Mr. Scully has made a sketch of the insect, from Mr. Scully's recollections of it as it appeared when first discovered complete. This sketch shows some interesting points. Chief amongst these is the presence, on the somewhat large head, of a strongly projecting beak, such as is characteristic of the Order Protohemiptera. The bases of the forewings are greatly expanded, as in *Eugereon*, leaving no room for large hindwings. Towards the end of the abdomen are a pair of leaf-like processes, which I think are really the partially expanded apical portions of the partly folded hindwings, the rest of which probably lie close to or under the abdomen and would not therefore be noticed by Mr. Scully unless specially looked for.
